Selection for Growth and Feed Efficiency in Broiler: Realized Heritability and Responses of Selection

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ABSTRACT

The trait of body weight at a fixed age under *ad libitum* feeding is becoming less attractive due to accumulating negative impact of traits correlated to body weight. The correlation between weight gain and fat deposition is low but positive. The main goal of this study was to estimate genetic parameters, realized heritability and responses of selection. Data consisted of two selection lines in broiler, namely body weight (BW) and feed conversion ratio (FCR) lines. Estimation of genetic parameter was calculated by ASREML procedures based on animal model. Estimation of heritability was calculated through the regression of phenotypic means on cumulatively differential selection. Responses of selection were estimated by using average breeding value at each generation. Estimated heritability for body weight was 0.42 for BW line and 0.59 for FCR line, respectively. Estimated heritability for feed conversion was 0.44. However, there was an inconsistency between estimated and realized heritabilities. All traits measured had small-realized heritability, even they were negative for body weight and feed conversion in FCR line. The realized heritability for body weight in BW line was 0.10, while those for body weight and feed conversion in FCR line were -0.14 and 0.03. Genetic correlation between body weight and feed conversion ratio was 0.18, whereas phenotypic correlation showed no difference to 0.

Key words: *genetic parameters, realized heritability, body weight, feed conversion ratio*

INTRODUCTION

During the past decades, major emphasis have been paid in selection programs for broiler to body weight and rate of gain (Chambers et al., 1981). However, the trait body weight at a fixed age with *ad libitum* feeding, is becoming less attractive due to the accumulatting negative impact of traits correlated to body weight. The correlation between weight-gain and fat deposition is low, but positive (Leenstra, 1987). The increasing amount of fat is one of the pronounced negative consequences of selection for body weight. Alternative selection characteristics might be feed conversion. The genetic correlation between feed conversion and percentage abdominal fat is favourable (Leenstra, 1987). Therefore, feed conversion can be used to select a leaner broiler, or sib selection for a low percentage of abdominal fat improves feed conversion (Pym and Solvyns, 1979; Leenstra, 1987).

Genetic parameters such as heritabilities and genetic or phenotypic correlation can be estimated by realized heritability or variance component using animal model. Many studies concerning this have been conducted for broiler population. For instance, Liu *et al.* (1994) revealed that realized heritability of 8 week body weight ranged from 0.22 to 0.28 for a high weight line and from 0.23 to 0.28 for a low weight line. Su *et al.* (1997) estimated heritability of body weight using animal model were of 0.25 (REML method) and 0.26 (Bayesian analysis), respectively. Heritability estimates of feed consumption and efficiency at constant age as summarized by Pym (1990) ranged from 0.2 to 0.8 and averaged at 0.45 for feed consumption; estimates for feed efficiency ranged from 0.18 to 0.56, and the average was 0.25. Khan (1976) reported a genetic correlation between 8 and 30 week body weight of 0.86 ± 0.27 for normal and 0.15 ± 0.26 for dwarf broilers.

Although genetic aspect of both body weight and feed conversion has been studied intensively, additional research is still needed. For decicion about an optimal selection program in broiler production, ample information is required on the heritability of body weight and of feed conversion.

The aims of this study were to estimate the genetic parameters and responses of selection of